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FOREST RESEARCH : 1940

PACIFIC NORTHWEST FOREST

AND

RANGE EXPERIMENT STATION

PORTLAND, OREGON

FOREST SERVICE

U. S. DEPARTMENT OF AGRICULTURE

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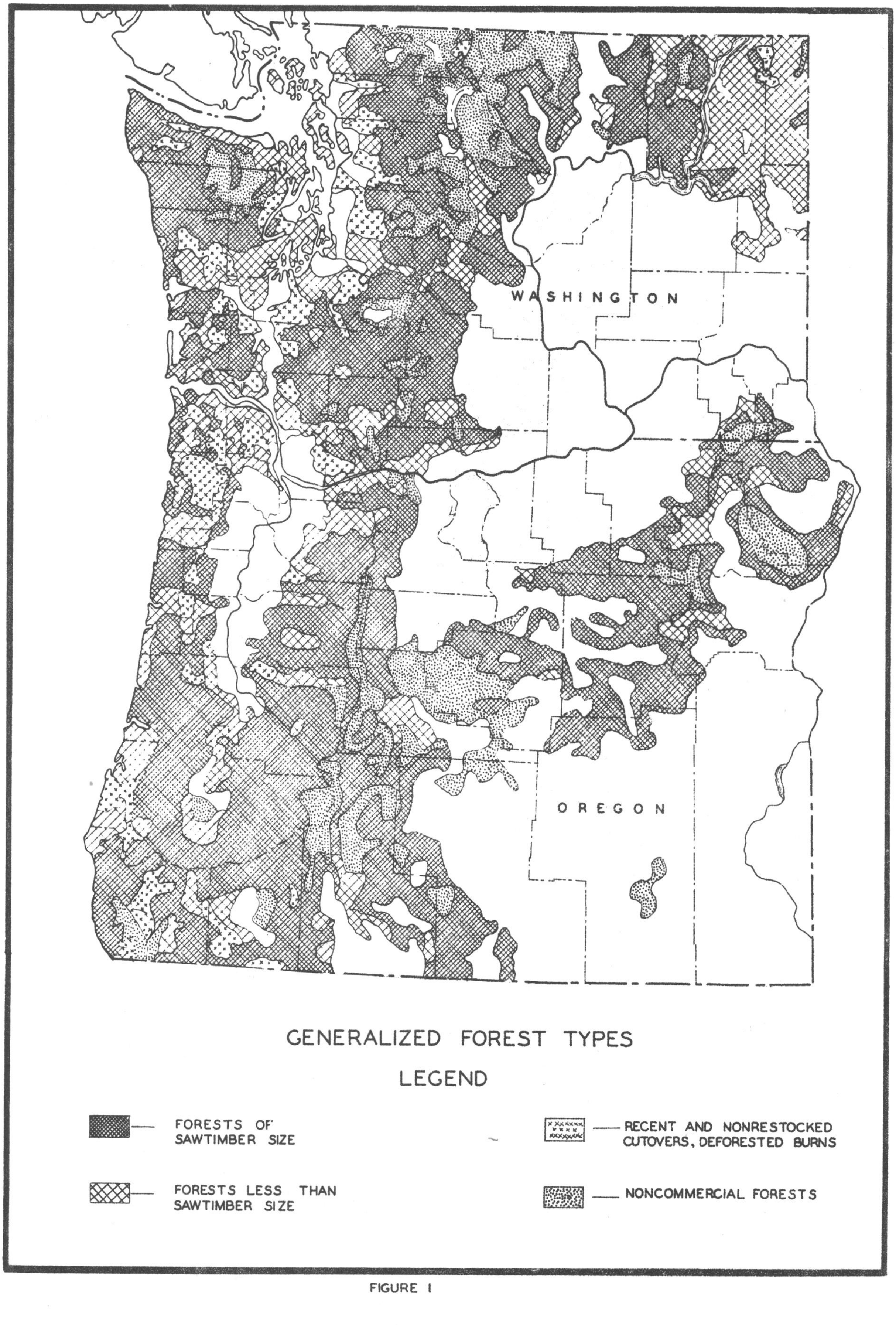

WASHINGTON
OREGON
GENERALIZED FOREST TYPES
LEGEND
FORESTS OF SAWTIMBER SIZE
FORESTS LESS THAN SAWTIMBER SIZE
RECENT AND NONRESTOCKED CUTOVERS, DEFORESTED BURNS
NONCOMMERCIAL FORESTS

FIGURE I

FOREST RESEARCH: 1940

INTRODUCTION

New Impetus Given Forestry

During 1940 the tempo of public thought regarding forestry definitely quickened in the Pacific Northwest. The hearings of the Joint Congressional Committee, the Pierce acquisition bill, the well-known letters from Secretary Wallace on the forest problems of the region, the work of the Forestry Committee of the Oregon Economic Council, the public fire protection campaigns in Oregon and Washington, and the convening of the Oregon and Washington Legislatures have been among the more important causes.

The result has been wider public realization of the need for adequate fire protection and a demand for development of effective methods of securing it; general interest in partial cutting as a means of assuring continuous production from forest lands; increased public thinking about regulation of cutting on private forest lands; realization of the need for increased public acquisition of forest lands; and with that the necessity for solving the problem of Federal contributions to local government in lieu of taxes. Many problems have been raised and the proposals made for their solution have been controversial. This controversy, however, has focused thought and public interest.

The National Defense Program

The national defense program also has had repercussions upon the consideration now being accorded forestry. The Pacific Northwest has two-fifths of the Nation's timber supply, made up of softwoods preeminent for production of commodities widely used in defense activities, such as lumber, plywood, and wood pulp. It also contains species valuable for special purposes; for example, Sitka spruce for airplane manufacture and Port Orford white-cedar for storage battery separators. The region is now furnishing vast quantities of forest products for national defense. Livestock grazing on the region's range lands contributes wool, hides, and meat to help equip and feed the rapidly expanding military forces. Increased demand, rising prices, and disappearance of depression-enforced controls over production are bringing temptation to exploit forest and range to recapture profits long withheld. Countering these forces are fresh recollection of the damage done our national resources during the last war through wasteful practices, realization that in a war-blockaded world this Nation must be self-sufficient in these basic materials, and finally, realization that natural resources must be used wisely so that future national security shall not be jeopardized.

The Need for Research

These things point the way clearly towards the necessity for better use of the forest and range resources of the Pacific Northwest than has obtained in the past. In some cases the exact knowledge needed to make the desired improvement is now available; in others much research will have to be done and tested in the practical field of application before the requisite methods are ready for general use. It can be said, however, that the general principles, upon which sound forest and range management must be based, are known. Research must translate these principles into forms directly applicable to local conditions, so that they finally emerge as management plans.

In many cases progress toward better forest management is hindered by adverse economic factors rather than by lack of technical knowledge; many of these economic factors are temporary rather than permanent. The young forests of the Pacific Northwest must grow in the economic shade of the old-growth stands for some time to come. Their value will not be realized fully until there is less virgin timber. Failure to realize the future value of these younger stands makes difficult a broad appreciation of the need for their protection and wise management. It is the clear duty of public agencies to impress constantly upon the public the value of the young forests to the region's permanent prosperity and the consequent necessity for their protection from fire and from premature cutting.

Wise management of our great resource of old-growth timber must involve its gradual and orderly alteration to a growing condition rather than its rapid destruction. Where possible it should be transformed into a dynamic, growing forest by partial cutting. This method of harvest should leave a residual forest capable of growth and value increment, and free from any specially severe fire hazard. Where clear cutting is more desirable it should result in the good seed bed and ample seed supply necessary for the starting of a new forest. And the young forest must be protected from fire.

The range resource of the region is still in great need of management which will effectively husband soil and forage. Such needs can be met best by developing through research more careful methods of management designed to utilize the forage resource as fully as possible under conditions which will insure permanent productivity.

Forest and Range Experiment Station Research Continues

During 1940 the Pacific Northwest Forest and Range Experiment Station has endeavored to play its part to the limit of its resources in the solution of these regional problems. Many of the projects upon which it is working are long-time in nature; their results can be made available only when the experiments have run their proper course. But the end results will give definite information on many points still controversial because of lack of factual data. This report is designed to give information about the program of the Station and the results secured during the past year.

The territory covered by this Station, the States of Oregon and Washington, presents varied forest conditions because of the wide range of climate and topography. In general, however, it may be divided into two regions, the Douglas-fir region west of the Cascade Range and the ponderosa pine region east of the mountains. The former is characterized by abundant rainfall, humid conditions, dense stands of timber, a concentrated population, much industrial activity, and by the predominance of Douglas-fir in the forests. The latter is characterized by scanty rainfall, semiarid conditions, sparse stands of timber, a scattered and sparse population, less industrial activity, and by the predominance of ponderosa pine in the forests. Naturally, the forest problems of the two regions have much in common, but at the same time are so widely divergent in details as to warrant separate discussion.

THE DOUGLAS-FIR REGION

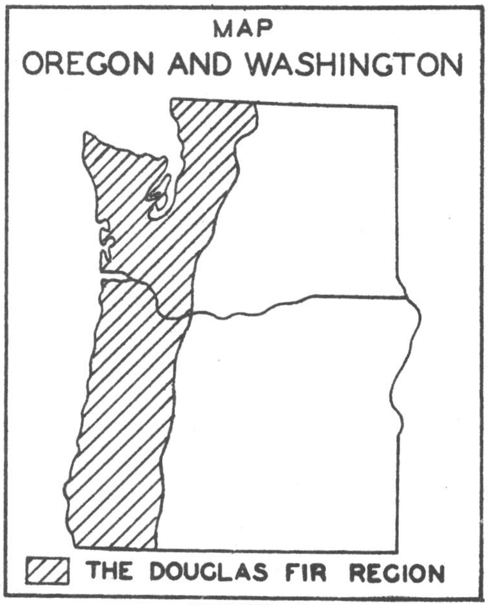


FIGURE 2

The over-all problem of the Douglas-fir region is the conversion of the stagnated mature forests to a growing condition through intelligent and efficient utilization and without sacrifice of future productivity. Practically every other problem encountered in this important forest region can be traced to the pressure to liquidate private timber holdings and the desire to place all forest land, regardless of ownership, on a productive basis. A complete statement and analysis of the region's forest problems, proposals for their solution, and complete data on the nature and extent of the forest resources are contained in "Forest Resources of the Douglas-Fir Region", a 169-page report published in 1940.

Condition of the Resource

The magnitude and complexity of the problem are clearly shown by a few basic facts. The Douglas-fir region now has about 500 billion board feet, log scale, which is 42 percent of the United States total. About 44 percent of this volume is on private lands, 39 percent on national forest land, and 17 percent on other public lands. About 60 percent is Douglas-fir, 20 percent western hemlock, 9 percent balsam firs, 2 percent Sitka spruce, 5 percent western redcedar, and 4 percent other species. This forest varies in age, density, quality, accessibility, ownership, the carrying costs imposed on the owner (in case of private timber) and in many other factors. On the whole the old-growth forest is classed as nongrowing, because while individual trees are growing slowly some are dying from disease, fire, wind throw, insect attack, or senility, and others are losing more wood volume through decay than they are adding in growth. Despite adverse factors, it is the region's most valuable resource.

An inventory of this vast resource made in past years has been the base upon which the plans for the future are predicated. The amount of standing timber, its rate of growth, ~~and the rate of its depletion~~ by fire, cutting, insect attack, ~~decay and~~ other destructive agents are statistics in demand by public, quasi-public, and private agencies. Much time is devoted to preparing and furnishing information of this type in the shape of both maps and statistics. But these data rapidly become out of date; one of the Station's continuing projects keeps them current. During the past year the records of depletion through cutting were summarized ~~and added to the series~~ already available, and the annual production of lumber, lath, and shingles was compiled in cooperation with the Bureau of the Census. Forest inventories of Jefferson, Kitsap, Mason, and Wahkiakum Counties in Washington and of Benton and Polk Counties in Oregon were revised in the field. Revised forest statistics for Coos, Cowlitz, Snohomish, Thurston, and Washington Counties, and revised 1-inch-to-the-mile type maps for Polk, Benton, Lewis, Wahkiakum, Cowlitz, Thurston, Kitsap, and Mason Counties were published.

Adequate Forest Protection Fundamental

Without adequate forest protection all efforts to harvest the mature crop economically and to encourage scientific production of a new crop are fruitless. Fire, insects, disease, and wind cause the greatest damage to the forest, and in the Douglas-fir region the most destructive of these is fire. Fires of holocaust proportion in the virgin forest or fires covering a few acres in a fern patch are both to be deplored. The havoc created by the former is evident to everyone because of its extent and because of the merchantable timber killed or consumed by the flames. The fire in the fern patch may be as destructive on the acreage covered because it kills the seedling beginnings of the future crop, a loss that may be irreparable because of the scarcity of large trees to reseed the area. Consequently, improved fire protection methods have loomed large in the Station's program.

Fire Protection Studies Focused on Problems of Private Forest Land

One of the important studies during 1940 was the analysis of fire problems of the private forest lands in a sample area in western Snohomish County, Washington, and the preparation of a plan for adequate fire control on these lands. A report summarizing the results of this study has been published. The report showed that all forest lands in the sample area needed and were getting fire protection, although two-fifths of the acreage was not bearing its share of the cost. Most of the nonpaying lands are either county-owned or tax delinquent. A large acreage of private lands is exempted because the owner resides on the land. Half of the nonpaying lands are in the rural residential district (fig. 3), approximately three-tenths are in the cut-over district, slightly less than two-tenths are in the agricultural district, and the small remainder is in the virgin forest district. The logical conclusion is that all forest land regardless of ownership should be required to support fire control. The report emphasized, also, the need for a yearlong warden force; greater recognition by the owners and the general

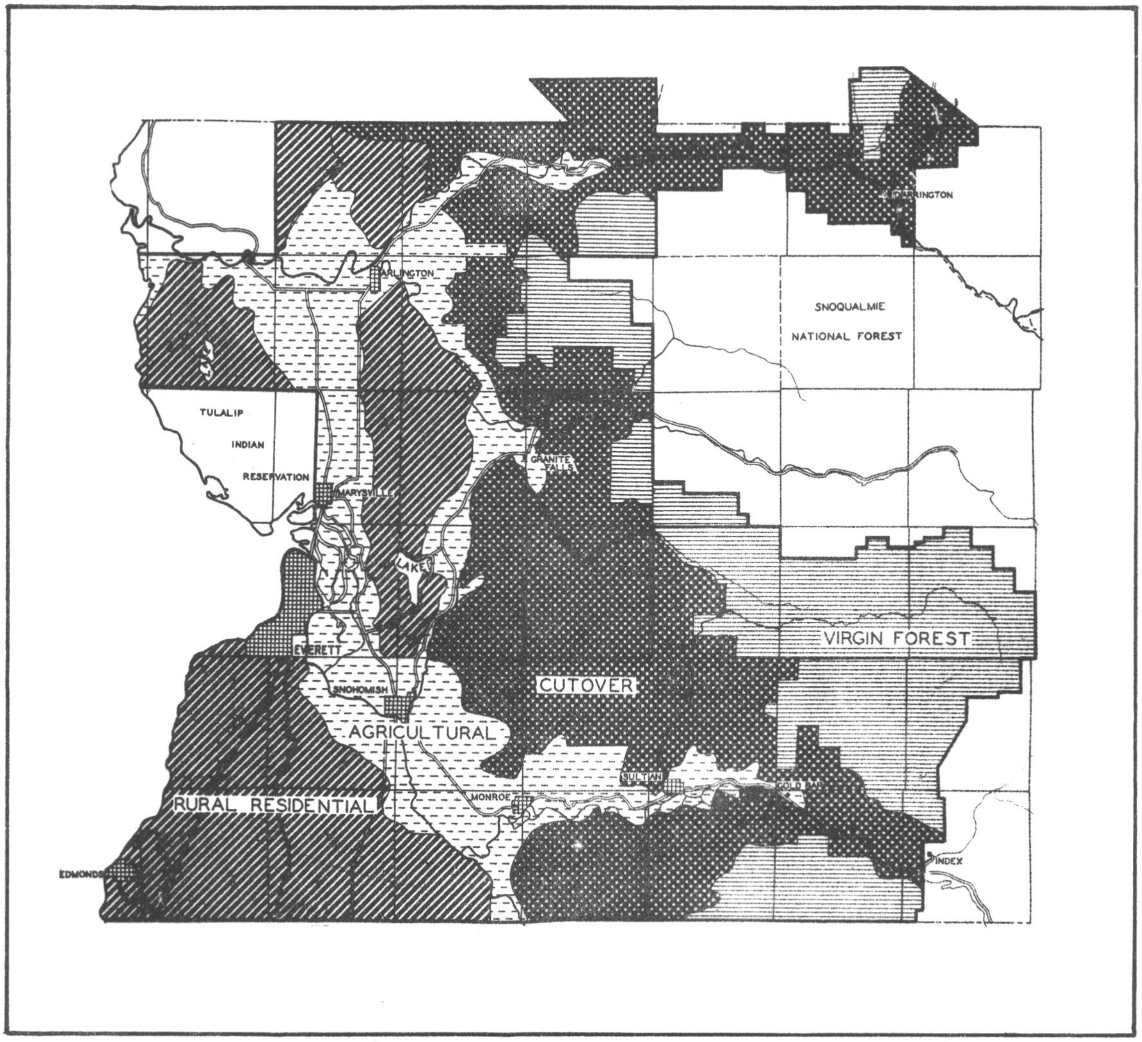

DARRINGTON
ARLINGTON
SNOQUALMIE
NATIONAL FOREST
TULALIP
INDIAN
RESERVATION
MARYSVILLE
GRANITE FALLS
LAKE
VIRGIN FOREST
EVERETT
SNOHOMISH
CUTOVER
AGRICULTURAL
SULTAN
GOLD BAR
MONROE
RURAL RESIDENTIAL
INDEX
EDMONDS

FIG. 3. LAND USE DISTRICTS SNOHOMISH COUNTY

public of the value of forest lands, especially those with young growth; the need for providing means whereby owners or operators who are liable for fire fighting or hazard reduction expenses can make advance budgetary arrangements for meeting these expenses when they are incurred; the need for a flexible budget; and the need for vesting in the fire control agency the responsibility for prompt, strong action against all fires without lessening the legal and financial obligations of the owners and operators.

The conclusion was reached that the problem of adequate protection of private forest lands is primarily one of land use and economics, not one of imperfect techniques of fire detection and suppression. If all forest lands contributed, fire control could be strengthened proportionally. Analysis of the data indicated that the nonpaying lands were primarily submarginal for private ownership. Furthermore, the report showed that the incidence of fires was greatest in areas of improper land use. A similar study has been initiated in the Clackamas-Marion Counties, Oregon, fire control unit.

Burning Index Table Revised

The fire danger rating system was further refined through the preparation of a 100-unit burning index table which was used experimentally in 1940 and adopted, with slight modifications, for use on the national forests during 1941. A 100-unit table was necessary to show the true magnitude of differences in fire behavior arising from fuel moisture and wind conditions, because it has been found that the fastest spreading fires spread at least 100 times faster than the slowest.

Forest Land Taxes and Local Government

Taxes may be considered in the same category with fire protection as a cost of owning timberland. The tax burden is one factor discouraging conversion of mature forests to properties managed on a continuous production basis approaching a sustained yield and discouraging retention of private logged-over lands for future forest purposes. The Station is studying the problem from two approaches: (1) The adaptation of local government to forest land use and the analysis of existing and proposed local tax laws applicable to forests, and (2) the causes, results of, and remedies for ownership breakdown.

Rural tax rates for 1940 in Oregon and Washington counties were analyzed and the results published. The great range in tax rates within the forest land area of most counties was the outstanding fact revealed by this study. This range results almost entirely from the needs of school districts which depend to a great extent upon taxes levied upon property within their boundaries. The delineation of these boundaries is an important factor in determining that part of the cost of owning forests which can be attributed to taxes. Total tax rates in some forested school districts are twice those in other forested school districts in the same county. Cases in which the total tax rate on a forest property is doubled in a single year are not uncommon. Long-term forest management under private ownership, such as is involved in converting old-growth forests to growing conditions, meets a serious problem with such extreme uncertainties in tax costs. A reorganization of local government which would broaden the tax base for support of education and other local government functions in the wild land areas and yet insure efficient performance of these functions would remove a serious handicap to better land use. This reorganization would involve reallocation of some basic services to the State, rationalization of service and tributary areas of the governmental units, and their classification according to the degree to which they are able to render and support the full complement of services. Here flexibility would be an ideal. Broadening the tax base would not necessarily involve any additional or new source of revenue. It would discourage government extravagance in some places and provide a more equitable distribution of the tax revenues of the region. The benefits of such a reorganization would accrue especially to those businesses such as forestry where long-term management and a reasonable stability or certainty of future costs are essential, and in those areas where forest lands predominate.

A sound and workable special forest tax law, equitable assessments, and the adaptation of local government to forest land use would remove the property tax handicap to forest growing.

Material collected during the past few years on breakdown of private forest land ownership, the so-called New Public Domain study, has been analyzed and the results are being prepared for publication in several reports. Overappraisal of properties was found to be the chief contributing cause, and perhaps the most important direct cause, for breakdowns in private forest land ownership. It was also concluded that the greatest discrepancies in appraisal occur from overappraisal not from underappraisal. Overappraisal stems from treating each parcel of land as an independent unit without consideration of its relation to other parcels forming an operating unit. Inevitably, the sum of the appraised values of the parts exceeds the value of the entire unit. In appraisal, whenever parts are synthesized with the whole, overappraisal is diminished or eliminated according to the success of the synthesis.

Economic Aspects of the Size of Operating Units

There are significant relations among (1) the area of a self-sufficient forest holding, (2) management of the holding on a basis approaching a sustained yield, and (3) abandonment, tax delinquency, and forfeiture for unpaid taxes. When an area is smaller than a mechanical operating minimum, sustained yield operation becomes impractical, and abandonment, tax delinquency, and forfeiture ensue. The most important variables defining optimum mechanical minimum of areas supporting average Douglas-fir stands would be productive capacity, lay of the land,

and type of logging equipment used. The mechanical minimum for an operation employing donkey engines may be double that for an operation employing tractors, although one may be as efficient as the other. Most private holdings in the region are less than present mechanical minimums under both types of operation and tend to become smaller and smaller. One of the challenging questions in this situation is: Can these two types of operation be so modified or can other types be devised so as to reduce mechanical minimum areas to the size of the average private holding?

Cooperative Assistance Given Other Planning Agencies

The increased public attention given forestry matters is being expressed in a large measure through planning bodies. Invariably such agencies rely upon the Station for basic data. These relationships center around the broad economic aspects of the forest problem. Conferences were held during 1940 with State officials and others on such matters as organization and management of tax-forfeited lands, on tax delinquency laws and their administration, and on rural zoning. Assistance was given in drafting a measure to broaden Oregon forest acquisition powers. A statement was prepared of the settler problem in forest districts of Oregon, possible solutions, and administrative problems in rural zoning, which was incorporated in a report to the Oregon Economic Council.

Douglas-Fir Logging Methods in Transition

Within recent years there has been a marked change in the methods of logging Douglas-fir stands. From the introduction of railroad and steam-donkey logging until the introduction of truck and tractor logging, approximately a decade ago, the common practice was to log clean and burn the debris with little or no consideration of a source of seed supply to restock the vast denuded areas. The expanding use of lighter, more mobile equipment is leading to more and more partial cutting; however, large areas are still cut under the old system.

Reduction of the area logged under the old clear cutting methods correspondingly lessens the seriousness of the forest problem. The areas being logged by the new methods are frequently less extensive and some are broken up by patches or strips of green timber which provide seed for natural regeneration on the cut-over areas. But many of the problems created in the past are still prominent and challenge the ingenuity of the forester and the operator. Regeneration has failed on extensive areas because they have been burned and reburned. Many of these areas must be planted because there is no available seed supply for natural regeneration. The problem is further complicated by widespread soil erosion, reversion of vast acreages to public ownership, and sale for agricultural purposes of land unsuited for that use.

Some idea of the seriousness of the problem of regeneration on the older clear-cut areas is given by a comparison of data from the original and revised forest-survey inventories of 12 counties in the Douglas-fir region. The 1933 inventory showed that of the area clear cut before 1920 about 32 percent, amounting to 366,785 acres, was nonrestocked; at the time of the second inventory, averaging about 6 years later, only 66,352 acres (18 percent) of the nonrestocked area had restocked and 300,433 acres remained nonstocked. Areas clear cut from 1920-29, inclusive, were classified as "recent cutover" and not examined for restocking in the 1933 inventory. In the second inventory this area, which totaled 890,295 acres, was examined and it was found that 381,038 acres was restocked and 509,257 acres was nonrestocked. These figures indicate clearly that the rate of restocking on the older clear-cut land is exceedingly slow and not always sure. A measure of the adequacy of stocking is gained by the classification of the 447,390 acres of the above two categories that had restocked; 15 percent was well stocked, 34 percent medium stocked, and 51 percent poorly stocked.

Partial Cutting Presents New Problems

Partial cutting on private lands is used generally as a means of liquidation. It is the problem of research to determine if this "zero-margin" cutting can be made compatible with reforestation and forest protection, as well as to determine where and how partial cutting may be employed as a sound forestry practice on sustained yield operations. These newer methods present a series of new problems which have resulted in a reorientation of the Station's program. Some of the conclusions reached have application regardless of the type of logging used; other conclusions are applicable to either one or the other. Hence it is well-nigh impossible to discuss them except as a unit.

An Example of Current Use of Forest Research

During the past year several field conferences were held at which members of the Forest Management staff joined with representatives of the Administrative staff to discuss slash disposal on partial cutting operations. A set of instructions for cutting practices in the different type variations that occur in the region was prepared at the request of the Regional Forester. Thus the results of management research are being applied immediately.

Partial Cutting Emphasizes Need for Better Utilization of Hemlock and Balsam Firs

Partial cutting may result in an increased proportion of western hemlock, the balsam firs, and other secondary species in the mixed types. At the same time the relative amount of these species in the region as a whole is steadily increasing as cutting is concentrated in Douglas-fir forests. Utilization of western hemlock and the balsam firs is one of the region's puzzling problems. A paper pointing out advantages of western hemlock was read before two audiences of timber operators and published in two trade journals.

Preliminary survey was made of the practicability of using western hemlock and the balsam firs in plywood. This survey is a cooperative project with the Douglas Fir Plywood Association, the Forest Products Laboratory at Madison, and the Station. Logs of western hemlock, noble fir, and Pacific silver fir were followed through plants in Tacoma, Hoquiam, and Everett, records being made of yields, quality of veneer, cutting qualities, etc. The consensus seems to be that suitable plywood can probably be made from these species, that the technical problems will not be too difficult, and that the economic problems of production at a reasonable cost may be the bottleneck.

Some of the secondary species have been difficult to introduce on a market already supplied with accepted woods because of some inherent property which it is possible to modify or circumvent. One example, for instance, is the lack of resistance to decay which mitigates against the use of some woods for poles. Telephone poles provide an outlet for small-sized trees that could be removed during thinning operations. Since 1932 the Forest Service has used large quantities of an arsenic paste preservative which can be applied cheaply to unseasoned poles cut along the right-of-way. Experimental lines established in various parts of the region and subjected to biennial inspection are just beginning to show results. It seems apparent (1) that the treatment more than doubles the effective life of decay-susceptible woods and (2) that the cases where the treatment was not effective can be traced to faulty application rather than to deficiencies in the material.

Stand Structure Data Needed For Partial Cutting

When partial cutting is practiced the cruise of the standing timber should be qualitative as well as quantitative. If the purpose of a cruise is to determine values it is particularly important to be able to predict where losses from breakage and cull would be likely to occur and size and quality of timber that would be lost. Data from a cooperative study participated in by the Simpson Logging Company, the Regional Office, and the Station shed light on this problem. In this study some 600 tagged and numbered Douglas-fir veterans, chiefly ranging from 50 to 90 inches in diameter were studied on their journey from stump to log raft to determine, among other things, the amount and character of the loss in log scale that occurs at various stages of the operation. The detailed results were published in the May 1940 Timberman under the title "Volume Losses in Logging and Marketing Old-Growth Douglas Fir." The following table summarizes data contained in this article.

Summary of Volume Losses by 32-foot Logs

	Butt log	2d log	3d log	4th log	5th log	6th log	Total all logs
Top d.i.b. in inches	50"	45"	40"	35"	29"	22"	
Gross woods scale, bd. ft.	3,744	3,036	2,408	1,752	1,218	668	12,826
Broken sections left, bd. ft.	0	25	108	270	448	374	1,225
Culled sections left, bd. ft.	390	94	143	123	180	152	1,082
Cull logs removed, bd. ft.	48	57	72	113	110	48	448
Water scale adjustment, bd.ft.	251	219	159	95	37	7	768
Bureau scale deductions,bd.ft.	442	315	231	166	92	26	1,272
Total loss, bd.ft.	1,131	710	713	767	868	607	4,795
Net Bureau water scale in bd. ft.	2,613	2,326	1,695	985	351	61	8,031
Net Bureau water scale in percent of gross woods scale	70%	76%	70%	56%	29%	9%	63%

Intelligent consideration of various systems of cutting old-growth forests requires knowledge of lumber grade recovery values from logs of various grades which can be traced back to trees of known description. Field work on a study covering 240 Douglas-fir logs scaling 256 thousand feet was completed in a Willamette Valley mill with a capacity per 8-hour shift of 100,000 board feet. This is the first of a series of mill production studies to be conducted in western Oregon and western Washington, designed to obtain data on lumber recoveries, log values, and milling costs for logs of different sizes and qualities from various parts of the region and under different milling practices.

Establishment of New Forest a Critical Problem

As a result of many years of research a great deal of information on regeneration, both natural and artificial, is now available. Publication during the past year of "Vegetative Succession Following Logging in the Douglas-Fir Region" makes available valuable data on the stage of plant succession that accompanies the establishment of a new forest crop. Other data relative to regeneration were obtained during 1940 from tests of period of viability of seeds after falling, measure of seed fall, seed tree losses, and overhead shade tolerance of Douglas-fir seedlings.

Research on various phases of partial cutting has also been under way at the Station for several years to furnish fundamental data concerning effects on the residual forest and site of various forms of partial cutting. Permanent plots now totaling 75 records on a dozen selectively logged areas in the region were extended during 1940 to provide a 35 percent cut on three different stand structures on the Westfir (Oregon) operation. The best of these three variations leaves a well-stocked, completely sound reserve stand, while the poorest leaves the site occupied by decadent trees and inferior species, clearly illustrating the impracticability of applying uniform rules in much of the region. Study of the effect of different degrees of partial cutting on fire danger is embodied in this study and was continued throughout the season.

Fundamental Data on Forest Growth Strengthened

Problems do not end with the establishment of second-growth forests. In order to plan for the management of such forests data on behavior and rates of growth are essential. During 1940 remeasurements of 14 permanent growth sample plots in even-aged Douglas-fir were completed and three articles summarizing results were prepared. These latest measurements now round out a 30-year record of growth and mortality for three of the oldest plots in the region on site II in the Willamette National Forest. From age 54 to 84 years the stand on these plots made an average annual increment of 1,273 board feet, Scribner rule, per acre, bringing their present per acre volume to 71,600 board feet.

The records of five of the plots in 98-year-old site III Douglas-fir in the Columbia National Forest now cover 26 years, and during that period plot volume increased from 42,500 to 63,200 board feet per acre, an average annual increase of 796 board feet per acre. Mortality from insects and windfall seems to accelerate rapidly after the 80-year age in immature Douglas-fir. The annual loss per acre on the Columbia plots has averaged 258 board feet. If this volume could have been salvaged by thinnings, the net growth of the stand would have been increased 53 percent.

Remeasurements of 11 permanent plots that sample even-aged, 89-year-old spruce-hemlock at the Cascade Head Experimental Forest indicate an annual increment for the past six years of 240 cubic feet, 2.8 cords or 1,750 board feet, Scribner rule, per acre. (These species are used for wood pulp, hence values are given in cubic feet and cords.) This spectacular net increment was made in spite of windfall and suppression mortality that claimed a toll equal to one-third of the net growth of solid wood and one-fifth of the net saw-timber increment. The total stand of wood volume per acre in living trees has now reached 22,530 cubic feet, 262 cords or 129,700 board feet, Scribner rule. Averaging 20 inches in diameter, 200 trees per acre still thrive in this stand. In contrast, fully stocked Douglas-fir stands of this size support only 130 trees and southern pine fewer than 100. Herein lies a partial explanation of the remarkable yield of the coastal even-aged spruce-hemlock type. Less tolerant species cannot flourish in such density.

Measurements on the Mt. Hood plots on poor site III show that this Douglas-fir stand at an age of 55 years has accumulated a gross volume of 23,200 board feet per acre, or greater than that of the stands now being logged in most forest regions.

Realizing that it is possible to "improve upon nature" in growing timber, both in volume and quality, if the right practices are known, studies have been continued in pruning technique and to a lesser extent in thinning immature Douglas-fir stands.

Increasing use of tree climbers for high pruning has inspired the invention of a multiple spur tree climber, which is intended to lessen the damage to the wood fiber and yet give security to the climber. Six pairs are now being tested on three national forests.

Uses Other Than Timber Production Command Attention

Watershed management in the Douglas-fir region involves knowledge of the effect of forests upon streamflow and run-off. Plans have been prepared for a flood control survey on the Willamette River in Oregon and the Puyallup River in Washington, but action depends upon funds being made available. A survey would give consideration to the indirect forest values such as reduction in flood flows, protection of municipal water supplies, fish life, improved navigation conditions, etc. An active program of watershed management would endeavor to provide fire protection for all forest lands and restock denuded areas, by planting if necessary, and such other means as might be necessary to keep all forest lands in a productive condition.

THE PONDEROSA PINE REGION

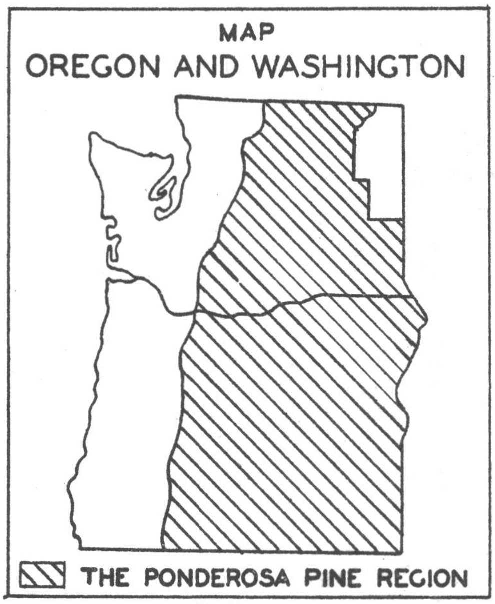


FIGURE 4

The major forest problem of the ponderosa pine region is also one of converting a mature forest to a growing condition. As in the Douglas-fir region there are extensive areas of nongrowing forests. Here the similarity ceases. The ponderosa pine forest is characteristically uneven-aged. Its chief natural enemies are insects. The open nature of the ponderosa pine forests and interspersed grassland make grazing an important factor in forest resource management. In this region, ponderosa pine far excels all tree species, except sugar pine, in value. Public-owned timber exceeds private timber in quantity and compares favorably with it in quality. The region has no waterways, and its products are marketed entirely by rail.

Survey Shows Status of Resource

The manuscript of the comprehensive forest-survey report for the ponderosa pine region recently completed and now being prepared for publication in Washington reveals the following significant facts:

(a) The region has 127.1 billion board feet of timber, of which 81.5 billion feet is ponderosa pine.

(b) Current annual gross drain on saw-timber stands is 2.6 billion board feet; half results from cutting and half from destruction by insects, fire, wind, and disease.

(c) Current annual gross growth is 1.1 billion board feet.

(d) Ponderosa pine suffers 87 percent of total cutting depletion, but only 58 percent of current net growth is being put on ponderosa pine trees.

(e) Current growth can be increased by conversion of nongrowing mature forests to growing condition; done most effectively by selective timber management.

(f) Privately owned ponderosa pine saw timber is only one-third of the region's total, but two-thirds of the drain on ponderosa pine is from private timber.

(g) Locally the timber supply situation is growing acute in this region. The Klamath Plateau and Deschutes River units furnish three-fifths of the region's timber cut. If present trends continue, production in these two units must be reduced to about one-quarter or one-third of present levels within three decades.

Data on Lumber Realization, Log, and Tree Values Available

Previous work at the Station has developed the maturity selection system of managing ponderosa pine forests. During 1940 additional work was done on expanding and consolidating knowledge of this system. Success of any selection system depends on having accurate information concerning lumber realization, log, and tree values. Pine mill production studies by the Division of Forest Products contributed to this end. Two studies, one conducted in a southern Washington mill and one in a southern Oregon mill, rounded out the information on this species. Preliminary conclusions based upon partially summarized data from ten studies show that so long as the limits of the species' natural range are not approached the proportion of each grade of lumber yielded by a log of a given grade and size varies within limits no greater than can be explained by differences in mill practice. As the limits of the range are approached the proportions of Select and of high Common lumber decrease, indicating a longer retention of branch stubs with its attendant decrease in the amount of knot-free wood produced. The data obtained and the conclusions reached have been accepted by national forest administrators and are being used in all appraisals for sales and timber exchanges on the national forests within the region.

Data on Rate of Growth Accumulating

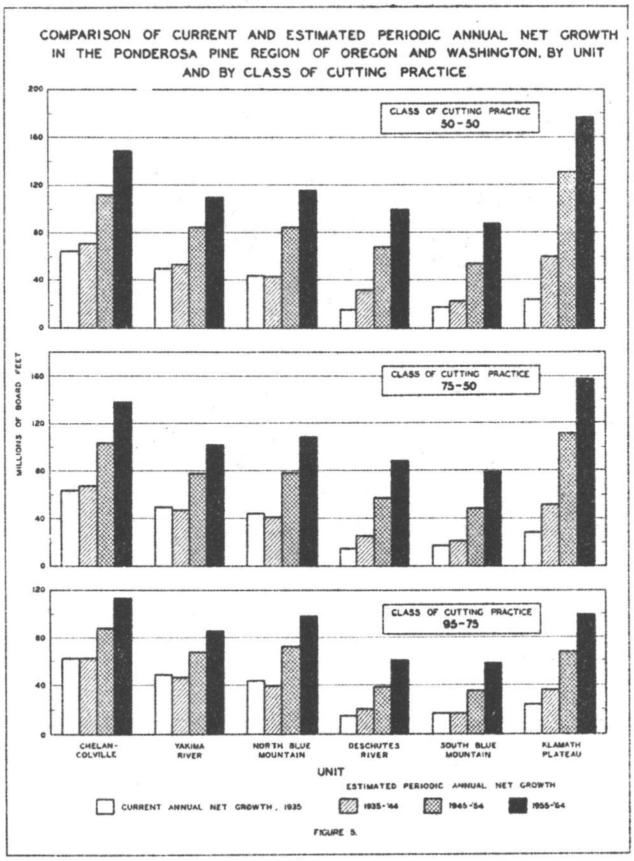
A knowledge of rate of growth is important to the manager of pine forests. Through the remeasurement of permanent sample plots a better understanding, not only of gross growth but also of mortality and net growth, is accumulating. Effort has been directed to determining the growth and mortality probability of each class of ponderosa pine tree, for this will furnish the foundation for deciding upon the method of cutting that will give maximum returns. On one set of plots the gross growth in the 25 years since their establishment was only 74 board feet per acre per year and the mortality 61 board feet, about half from windfall and half from insects. On another set of plots the gross growth in a 15-year period was 141 board feet per acre per year and the mortality only 12 feet. These were practically pure stands of ponderosa pine; almost nothing has been done as yet on the growth of mixed stands in the pine region.

By cooperation with the Indian Service a check was made of our growth-predicting technique in a stand that had been selectively cut. It showed satisfactory accuracy for the gross growth of the reserved trees of saw-timber size, but indicated a need for modifying the method of predicting the growth of the submerchantable trees.

Studies of thinning and pruning have been continued with a view to learning the practical stand improvement measures that will give maximum volume and quality production.

Possibilities of Increasing Growth Shown

"Forest Growth in the Ponderosa Pine Region", published June 1940, contains the findings of the growth phase of the forest survey. It shows that while current annual gross growth amounts to 1,144 million board feet, current annual net growth is but 219 million board feet. The difference of 925 million board feet is accounted for by mortality; 892 million feet in virgin stands due mainly to insect attacks and 33 million feet in immature stands, the normal mortality resulting from insect attacks, wind throw, suppression, and other causes. Other research has shown that the major part of the loss in virgin stands could be recaptured through a change in cutting practice. This is shown graphically in figure 5. The report shows the potential annual growth on commercial forest land under intensive management to be 876 million board feet on pine sites and 469 million board feet on other sites, a total of 1,345 million feet. The potential annual growth on commercial forest lands, exclusive of that occupied by mature timber, amounts to 591 million board feet, current annual growth on the same area amounts to 219 million board feet, or 37 percent of the potential, indicating that these lands are producing far below capacity.



COMPARISON OF CURRENT AND ESTIMATED PERIODIC ANNUAL NET GROWTH IN THE PONDEROSA PINE REGION OF OREGON AND WASHINGTON, BY UNIT AND BY CLASS OF CUTTING PRACTICE

FIGURE 5.

Improving Strains a Means of Insuring Quality of New Forests

Though silviculture in the pine region is predicated on natural regeneration, when that fails planting must be resorted to. The use of the proper seed source is important as well as the right grade of stock and the proper technique of planting. Tests begun 13 years ago of ten regional strains of ponderosa pine seed show pronounced differences in the size and vigor of the resulting trees, due to heredity, in the six experimental plantations. There was also a tenfold difference in the average height of the trees on the best and the poorest plantations due to site and climate, regardless of heredity.

Problems of Range Management Center Around Unequal Balance of Seasonal Range

The range problem in the ponderosa pine region stems from the unequal balance of seasonal range. The forage crop of the mountainous ranges of Oregon and Washington is ripe for harvest during the summer months when the vegetation on foothills and desert ranges is dried and parched from summer drought. These summer ranges fall 30 percent short of furnishing sufficient forage for the livestock cared for on the semiarid ranges and feed lots during the fall, winter, and spring months. To overcome this shortage of summer forage, the stockman has found it necessary to follow one of three practices: (1) Overstock the summer ranges; (2) graze livestock during the summer months on the semiarid ranges at low elevations which often are unsuited to summer grazing; (3) move livestock long distances to summer forage in other regions.

Principal factors contributing to the shortage of summer forage were the excessive numbers of livestock grazed and the poor range management practices employed on these ranges during the early settlement days. Between 1880 and 1910, for example, complete utilization of all palatable forage and premature grazing was extensively practiced. Indeed, in some localities the competition for range was so keen that it resulted in range wars. Such practices--particularly overstocking, premature grazing, and poor distribution of livestock--have resulted in changes in the plant cover and the resultant lowering of grazing capacities and losses of the productive topsoils. In recent years steps have been taken to halt further deterioration of summer ranges through adjustments in numbers of livestock and season of use, and by employing such practices as salting, development of additional watering places, riding, and fencing as a means of obtaining better livestock distribution. On many ranges the depletion processes have been stopped. On others, however, while the remedial measures have slowed somewhat the processes of range depletion, they have failed to arrest them entirely. Furthermore, of the area on which range depletion has been stopped, a large part has not been restored to a satisfactory forage cover.

Experimental Range Established

The Station is carrying on research designed to develop methods of livestock management and range utilization which will not only stop further depletion but will also restore the ranges and increase forage production. As a work center for carrying out cattle management research of this nature an area of 24,314 acres in the Umatilla National Forest in eastern Oregon was set aside on July 11, 1940, as the Starkey Experimental Range. Preliminary studies of the distribution and composition of the vegetation on the area and of its use by cattle were begun during the past summer. These will serve as a guide to cattle distribution under the experimental setup.

The Station is also cooperating with the Regional Office and the Oregon Agricultural Experiment Station in initiating research on the management of summer sheep ranges. These studies are to be carried out on the Bull Run Sheep Allotment near Granite, Oregon. Preliminary studies were made of composition and distribution of the vegetation and of its use by a band of sheep on this area.

Elk Population Important on Summer Ranges

Grazing by large numbers of deer and elk is a factor that needs to be considered when planning for management of summer ranges, since the utilization of range forage by these animals on areas where they concentrate may nullify the desirable effects of properly managing livestock. Studies made by the Station show that while forage preferences of elk and sheep are not entirely similar, they are sufficiently so that a real conflict may occur when considerable numbers of the two classes of animals graze in common. Studies made in 1940 on an area in the Whitman National Forest from which sheep had been excluded but which served as a summer range for elk showed that the elk alone removed 63 percent as much forage as did a band of sheep and the elk which grazed the same area in 1937.

Range Survey Methods Studied

Range surveys are designed to assist range management planning and practice by furnishing information on the forage value of different parts of a range area quickly and economically. The basic field procedure of range surveys is to map in place areas of recognized range types and to obtain, through ocular estimates, the average density of range plant species in the type areas. The forage value index obtained from a range survey is as dependable for a particular range type as the accuracy of mapping and the representativeness of the ocular estimate of density. Furthermore, the value of the survey for guiding management of the entire tract depends on the degree of uniformity of mapping and density estimating over the whole area.

Two systems of estimating plant densities are widely used in range surveys: (1) The reconnaissance procedure by which the field examiner chooses a representative area within the type on which to base his estimate, and (2) the square-foot-density procedure in which average plant density is obtained by estimates on a series of small plots impersonally located within the type.

Two systems of mapping type boundaries likewise have become standard range survey practice: (1) A grid of two parallel lines spaced a half mile apart through each square mile, and (2) sketching directly on aerial photographs with mapping control obtained through reference to

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topographic or vegetation features easily distinguished on the photograph. The Station made a field study in 1939 to determine which of the standardized estimation and mapping procedures combined into the best range survey method considering uniformity of results and per acre costs of field work.

The results of the study indicate that by the reconnaissance-aerial photograph method forage estimates are obtained that may be expected to vary only 13 percent from uniformity on areas 640 acres in size. Forage estimates by the reconnaissance-grid method were found to have an expected variation of 15 percent under the same conditions, the square foot density-aerial photograph method 16 percent, and the square foot density-grid method 24 percent. Field costs for the methods listed in the foregoing order were found to be 9.00, 9.09, 11.53, and 9.88 mills per acre.

Flood Control Survey on the Walla Walla River

In April a flood control survey was started on the Walla Walla Watershed, which drains an area in the north end of the Blue Mountain Range. The work is being conducted jointly by the Forest Service, the Soil Conservation Service, and the Bureau of Agricultural Economics. A watershed management plan is to be made which will cover the forage, timber, and other resources and recognize their effect upon streamflow, run-off, flood damage, and water conservation. It is merely viewing the natural resources in the very broadest concept in calculating the indirect as well as the direct benefits which can be derived from their conservation. This work will be finished during the coming year and it is expected to outline an action program that will provide some measure of protection from floods and soil erosion.

ACKNOWLEDGMENTS

The continuation of WPA assistance materially contributed to the work accomplished by the Station during 1940. The valuable services of the office workers made available through a WPA project enabled the technical staff to carry on and complete projects otherwise not possible.

Through the CCC organization the experimental forests have been staffed and the thinning, pruning, and other stand improvement work continued.

ADVISORY COUNCIL

The Advisory Council is a group of men, representative of the varied forest and range interests in the region, appointed by the Secretary of Agriculture to advise as to the problems which should be studied. These men, because of their knowledge of and practical association with the region, keep the staff in touch with the trends and needs of the forest users, and through their advice keep the work of the Station pointed toward practicality.

Members Appointed Prior to 1940

C. S. Chapman (deceased)
Donald S. Denman
Geo. L. Drake
S. V. Fullaway, Jr.
Geo. T. Gerlinger
T. S. Goodyear
W. B. Greeley
E. C. Johnson
E. C. Manning (deceased)
D. T. Mason
L. T. Murray
Paul Neils
Geo. W. Peavy
Wm. A. Schoenfeld
A. R. Watzek
Hugo Winkenwerder

New Members Appointed During 1940

Ed F. Averill
Mac Hoke
Dexter M. Keezer
N. S. Rogers
R. A. Ward
Robert B. Wolf

STAFF

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

Director

Stephen N. Wyckoff

Technical

Thornton T. Munger	Principal Silviculturist
Axel J. F. Brandstrom	Senior Forest Economist
Sinclair A. Wilson	Senior Forest Economist
J. Elton Lodewick	Senior Silviculturist
Wade DeVries	Senior Forest Economist
Raymond H. Chapler	Senior Forester
Robert W. Cowlin	Senior Forest Economist
Gerald D. Pickford	Senior Forest Ecologist
Donald N. Matthews	Silviculturist
Leo A. Isaac	Associate Silviculturist
Herman M. Johnson	Associate Forester
Wallace R. Robinson	Associate Forester
Floyd L. Moravets	Associate Forester
Philip A. Briegleb	Associate Forester
Warren H. Bolles	Associate Forester
William G. Morris	Assistant Silviculturist
Edward D. Buell	Assistant Forester
Elbert H. Reid	Assistant Range Examiner
Chandler V. Jensen	Assistant Range Examiner
Theodore Kachin	Junior Forester
Morten J. Lauridsen	Assistant Field Assistant
D. Lester Lynch	Assistant to Technician
Donald F. McKay	Assistant to Technician
Walter G. Petersen	Assistant to Technician
Bert C. Baker	Junior Field Assistant
Paul F. Liniger	Junior Field Assistant
William J. Allyn	Junior Field Assistant
Orville B. Cary	Under Field Assistant
Kermit B. Peterson	Under Field Assistant
Robert M. Porter	Under Field Assistant
Fremont McComb	Foreman
Donald L. Peters	Senior Fire Guard

Administrative and Clerical

June H. Wertz	Junior Administrative Assistant
Frances Elliott	Senior Clerk-Stenographer
Christina M. McPhail	Clerk-Stenographer
Inga E. Fulkerson	Clerk
Edna L. Hunt	Assistant Clerk-Stenographer
Evelyn L. Berg	Assistant Clerk-Stenographer
Dorothy E. Rude	Assistant Clerk-Stenographer
Ruth E. Campbell	Assistant Clerk-Stenographer
Leona M. Stevens	Assistant Clerk-Stenographer
Erna J. Jeppesen	Junior Library Assistant
Joseph DiGregorio	Assistant Messenger

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PROJECT STATUS SHEETS
1941

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RS - NW
SILVICULTURE
Harvest Cuttings
Douglas-Fir Region

January 1941

SILVICULTURAL STUDIES IN THE DOUGLAS-FIR REGION

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Harvest Cuttings, Douglas-Fir Region

PURPOSE OF WORK: To work out silvicultural basis for forest cutting practices in the Douglas-fir region.

REVIEW OF PAST WORK: Studies have been made on (a) seed production, dissemination, (b) physical and biological factors that govern seedling establishment after slash fires, (c) regeneration after crown fires and slash burns, (d) effect of slash burning on the forest soil, (e) survey of the condition of residual stands on partial cutting areas. Results are summarized in U.S.D.A. Bulletins 1200, 1437, 1493, and Circular 486, and "Handbook of Forest Practices", and other publications and manuscripts. In connection with selective logging (e) 37 temporary plots were established on cut-over areas and 20 permanent plots put in on national forest areas to be logged. An analysis was made and progress report prepared for a selectively logged 220-acre privately owned tract. A study of installment cutting on a 160-acre tract of old-growth fir was undertaken jointly with the Regional Forester's office and a private company, removing a heavy stand in five almost equal cuts.

ACCOMPLISHMENTS DURING PAST YEAR: Work was continued on the study of shade requirements of Douglas-fir seedlings. Further work was done on Technical Bulletin "Natural Regeneration in the Douglas-Fir Region." Sixteen selective logging plots were reexamined, progress reports prepared, and three new permanent plots and some temporary strips were put in on selective logging national forest sale areas. A 15-year progress report on "Mortality of Douglas-fir seed trees" was prepared. A paper on vegetation succession after logging based on 10 years of sample plot data was prepared and published. General examination was made of several selective logging areas both on and off the national forests. Considerable work was done on proposed instructions for timber cutting in the Douglas-fir region. Four articles for a recent issue of Forest Research Notes were by-products of this project.

PLANS FOR NEXT YEAR: The monograph on Douglas-fir regeneration to be completed. Permanent sample plots to be reexamined, particularly those in connection with selective logging. Continue seed reproduction, and environmental studies. Study national forest experimental selective logging timber sales in the Douglas-fir and spruce-hemlock types. Cooperate in stand improvement studies listed under Stand Improvement-Douglas Fir. Make search for a suitable area for a large-scale controlled experiment in various types of silvicultural treatment.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Munger and Isaac.

RS - NW
SILVICULTURE
Harvest Cuttings
Pine Region

January 1941

SILVICULTURAL STUDIES IN THE PINE REGION

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Harvest Cuttings, Ponderosa Pine Region

PURPOSE OF WORK: To determine the principles which are basic to good silvicultural practices in the pure pine and mixed conifer forest types in the ponderosa pine region.

REVIEW OF PAST WORK: This study has been a major project since the Station was organized in 1924 and was also worked upon as an administrative study for many years before that by the national forest organization. As a result there are available numerous detailed records and a large number of permanent test plots. These studies are the basis of many forest practices in use.

ACCOMPLISHMENTS DURING PAST YEAR: The three 25-year-old Whitman methods-of-cutting plots of 15 acres each were reexamined as was a similar 15-year-old plot of 10 acres on the Rogue River Forest. The permanent mortality strips on the Malheur Forest were given their annual check and the establishment report on this study was revised. The establishment report was written on the 520-acre harvest cutting experiment at Pringle Falls and the plots were given their annual mortality check. An article was written explaining the maturity selection system. This project has been merely on a maintenance basis, due to lack of funds this past year and will likewise be next year.

PLANS FOR NEXT YEAR: The five 10-acre methods-of-cutting plots on the Deschutes Forest and similar plots of the same acreage on the Malheur Forest are up for reexamination. It is planned to omit the annual check on the Malheur mortality strip next year and to continue it on a biennial basis. The pringle Falls harvest cutting experiment will be given its annual mortality check. Progress reports will be written on the plots examined during the past year and effort will be made to bring up to date the plot data now in the files which have not yet been worked up. No new field work is to be undertaken. In cooperation with the Logging Economics section a bulletin will be written on the Silvical and Economic Aspects of Selective Timber Management in Ponderosa Pine.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Munger and McKay.

RS - NW
SILVICULTURE
Stand Improvement
Douglas-Fir

January 1941

STAND IMPROVEMENT IN THE DOUGLAS-FIR REGION

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Stand Improvement Douglas-Fir Region

PURPOSE OF WORK: To determine best methods of stand improvement practices in the Douglas-fir region, including thinnings, prunings, liberations, cleanings, and improvement cuttings.

REVIEW OF PAST WORK: The Station maintains 27 and supervises 14 more stand improvement plots in second-growth Douglas-fir. Eleven of these thinned plots have been pruned. In addition, 3 plots have been established in second-growth Douglas-fir to test the effect of removing different percentages of live crowns in pruning crop trees. A total of 29 stand improvement plots have been established in decadent old-growth stands in order to test the cost and effectiveness of girdling, poisoning and felling of undesirable trees. Cleanings and liberation cuttings have been made in the red alder type. Technical guidance and field demonstrations have been given to the regional CCC stand improvement projects. Time studies have been made on some of these projects. A study of limb shedding and occlusion by dissecting large second-growth trees has provided a measure of the rate of natural pruning and quality increment in untreated stands.

ACCOMPLISHMENTS DURING PAST YEAR: Current remeasurements of permanent plots have been kept up-to-date. Time studies have been made of pruning. An advance has been made in the technique of high pruning. A start has been made on the design of a tree climber with multiple spurs that will not puncture the wood. Inspection and instruction of CCC stand improvement has been given on the Olympic, Mt. Baker, Columbia, Willamette, Mt. Hood, Umpqua, Siuslaw, Siskiyou, and Rogue River. Principles of Port Orford white-cedar release have been worked out for mixed Douglas-fir - Port Orford white-cedar sapling stands on the Siskiyou.

PLANS FOR NEXT YEAR: Pruning time studies will be extended to show the range of costs in various stands by various methods. Field instructions and demonstrations will be given CCC foremen and enrollees on regional stand improvement projects. Current examinations of existing plots will be made.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Kachin.

RS - NW
SILVICULTURE
Stand Improvement
Ponderosa Pine

January 1941

STAND IMPROVEMENT IN THE PONDEROSA PINE REGION

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Stand Improvement, Ponderosa Pine Region

PURPOSE OF WORK: To determine best methods of stand improvement practices in the ponderosa pine region, including thinnings, prunings, liberations, cleanings, and improvement cuttings.

REVIEW OF PAST WORK: Eight thinning plots established and remeasured to test response of young pine to the several forms of thinning. Two liberation plots laid out to measure growth of young ponderosa pine following release from overtopping lodgepole. A 40-acre thinning made in 95-year-old pine at Pringle Falls through sale of sawlogs. Nine thinning study plots established by forest personnel on the national forests. Completed stand improvement time studies have provided a basis for estimating costs on specific areas. A measure of the value increment to be anticipated following pruning has been devised through analysis of growth and log value data. Technical guidance has been given to all regional CCC stand improvement projects.

ACCOMPLISHMENTS DURING PAST YEAR: Seven new plots established at Pringle Falls in the 1938 thinned area and one spot thinning plot on the Chelan. Time studies made and inspection and instruction given on CCC projects on the Snoqualmie, Wenatchee, Whitman, Chelan, Colville, and Fremont. Reports have been prepared on the reexamination of sets of plots on the Umatilla, Malheur, and Ochoco. Improvement of pruning technique has been made by determination of proper angle of the saw blade to the pole or handle.

PLANS FOR NEXT YEAR: Extend the Lookout Mountain thinning and plot establishment under way at Pringle Falls. Supplement time study of crop tree pruning and release. Give field instruction to CCC foremen and enrollees on stand improvement work. Establish additional crop tree release and pruning experiments and time studies. Make current examinations of existing plots. Improve or redesign pruning tools.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Kachin.

RS - NW
SILVICULTURE
Silvics
Phenology

January 1941

PHENOLOGY IN THE PACIFIC NORTHWEST

FIELD DIVISION: Forest Management Research

WORK PROJECT: Silviculture

LINE PROJECT: Silvics, Ecology

PURPOSE OF WORK: To build up a record from representative stations in the forested areas of Washington and Oregon of the time that forest trees, range plants and their associated plants vegetate, bloom, and ripen fruit. This information is useful in collecting seeds of forest and range plants, in determining the range readiness of grazing lands, the fire hazard of herbaceous vegetation, and in other problems of forest and range management.

REVIEW OF PAST WORK: Observations have been made in the Douglas-fir region since 1927, and in the ponderosa pine region east of the Cascade Range since 1932. On each national forest in Oregon and Washington there are one or more rangers who record at weekly intervals the progress of plant growth. In addition observations are made on several experimental forests, and on the demonstration forests of the local forest schools.

ACCOMPLISHMENTS DURING PAST YEAR: Records were continued by some 30 observers. A text was written to go with the summary tables made in 1938, and copies of this are available for students of the subject. A phenological calendar could not be made as anticipated. Cone crop reports were collected, compiled and issued as usual.

PLANS FOR NEXT YEAR: It is recommended that the project be dropped for the present, partly because the Station lacks the personnel to give it adequate supervision and partly because the scrutiny of the data made this year indicates that results of the desired scientific accuracy are not being obtained under the present scheme. The University of Washington and Oregon State College have been offered the use of the vast number of records that have accumulated and it is hoped some one may make more analysis of them than the Station can give.

It is proposed that the cone crop reporting be continued as a routine duty of the field.

DATE OF COMPLETION: Closed 1941.

ASSIGNMENT: None.

RS - NW
MENSURATION
Stand Studies

January 1941

GROWTH AND YIELD IN ALL TYPES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Mensuration

LINE PROJECT: Stand Studies

PURPOSE OF WORK: To increase knowledge of growth and yield of the forest types of the Douglas-fir and the ponderosa pine regions.

REVIEW OF PAST WORK: Standard even-aged yield tables for the Douglas-fir, spruce-hemlock, and ponderosa pine types and a yield bulletin for selectively cut ponderosa pine stands have been published. Preliminary investigations of growth cycles in ponderosa pine have been made. Sixty-one permanent growth sample plots in typical even-aged stands have been established and remeasured at 5-year intervals as a check on the normal yield tables. Studies of growth in the Douglas-fir and ponderosa pine regions have been completed and published as a part of the forest survey. Permanent sample plots have been established in partially cut Douglas-fir stands. (See project sheet for RS-SILVICULTURE-Harvest Cuttings.)

ACCOMPLISHMENTS DURING THE PAST YEAR: Systematic analysis of increment core measurements made by the Forest Insect Laboratory on some 8,000 trees on 30 of their permanent 10-acre sample plots was initiated as a cooperative undertaking. Object: To provide a basis of estimating growth of ponderosa pine by Keen tree-class, d.b.h. class, site index and volume per acre. Twelve permanent growth study plots in even-aged stands were reexamined and results computed. Two new plots were established. Three articles summarizing findings of sample plots were published. Growth trends of non-normal Douglas-fir second-growth stands have been computed from sample plot records. Rate of natural pruning in second-growth Douglas-fir summarized as an evidence of quality growth. Work done on growth phase of forest survey described under that project.

PLANS FOR NEXT YEAR: Continue analysis of ponderosa pine growth by Keen tree-class in cooperation with the Forest Insect Laboratory. Publish trend of growth in non-normal, immature Douglas-fir. Make current examinations and computations of existing plots. Growth data for partially cut Douglas-fir stands will be analyzed as they accumulate from plots established under RS-SILVICULTURE-Harvest Cuttings. Make growth and sustained yield analysis of Grays Harbor unit as part of forest survey project, which see.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Briegleb.

RS - NW
DENDROLOGY
Arboreta

January 1941

TESTS OF EXOTICS AT WIND RIVER ARBORETUM AND ELSEWHERE

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting

PURPOSE OF WORK: To test for forest planting exotic trees including Northwest species outside their natural range at the Wind River Arboretum and elsewhere.

REVIEW OF PAST WORK: A large amount of planting of exotics has been done on the national forests and records collected as to the results. Commencing in 1912 an arboretum was started at Wind River which has been continually maintained and expanded. It now contains plantations of about 150 conifers. Progress reports on this arboretum were issued in 1932 and 1937. At Cascade Head Experimental Forest and Pringle Falls Experimental Forest small tests of exotics worth trying in these localities have been started. Cooperation has been given other arboreta locally and nationally.

ACCOMPLISHMENTS DURING PAST YEAR: Routine maintenance of the Wind River Arboretum and a small number of acquisitions. Establishment of small plantations of ponderosa pine west of Cascades and of noble fir, black locust, and Port Orford white-cedar on Olympic National Forest. Routine work in connection with other tests of exotics and cooperation with other arboreta.

PLANS FOR NEXT YEAR: Continuation of routine maintenance of the Wind River Arboretum and continued search for seed of some of the rare conifers that are lacking. Compilation of all existing material on behavior of exotics in test plantations throughout the region would be highly desirable if time can be found to make it.

DATE OF COMPLETION: Continuous.

ASSIGNMENT: Munger.

RS - NW
REGENERATION
Nursery and Planting

January 1941

REGENERATION - PLANTING AND NURSERY STUDIES

FIELD DIVISION: Forest Management Research

WORK PROJECT: Regeneration

LINE PROJECT: Planting

PURPOSE OF WORK: To determine the best methods of nursery and planting technique in the Pacific Northwest.

REVIEW OF PAST WORK: An immense amount of work done in the past 31 years, largely centering around the technique of artificially reforesting in the Douglas-fir region with Douglas-fir. Following classes of work are recognized: (a) Direct seeding tests, in recent years, chiefly with small seeded species in the fog belt and in relation to rodents; (b) technique for growing stock at Wind River Nursery, chiefly Douglas-fir and secondarily other species; (c) best density; (d) methods, season, and sites; (e) damage to plantations by animal cropping; (f) sites suitable for noble and Pacific silver fir; (g) practicability of planting alder firebreaks; (h) planting in brush fields, including methods of removing brush; (i) treating planting stock with Dowax to check excessive transpiration and increase initial survival.

ACCOMPLISHMENTS DURING PAST YEAR: (a) Direct seeding cooperative study with Fish and Wildlife Service on seed consumption and rodent repellant treatment of seed on four Forests; (b) current work on Sitka spruce, Port Orford white-cedar, western hemlock, Pacific silver fir, and Shasta red fir for Christmas trees; (c) no work this year; (d) current examination of test plantations and additional tests with Douglas-fir, ponderosa pine, noble fir, etc., and furrow planting of ponderosa pine on Deschutes; (e) establishment and examination of strychnine sprayed trees; (f) (g) current examination of test plantations; (h) additional test plots established in lands cleared by machinery and by hand; (i) Dowax treatment ineffective. A technical bulletin on methods of artificial reforestation in the Douglas-fir region has been in preparation.

PLANS FOR NEXT YEAR: Continuation of periodic examinations and reports on all phases of this project. (b) Tests of lighter sowing in nursery. Finish the bulletin on artificial reforestation.

DATE OF COMPLETION: (a) 1948; (b) (c) (d) (e) continuous; (f) 1941; (g) 1941; (h) 1943; (i) 1940.

ASSIGNMENT: (a) (c) Isaac; (b) (d) (e) (f) (g) Kümmel; (i) closed.

RS - NW
FIRE
Behavior

January 1941

FIRE STUDIES - BEHAVIOR

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest Fire Protection

LINE PROJECT: Behavior

PURPOSE OF WORK: Studies of the behavior of fire with respect to start and spread as related to weather, topography, fuel, and other factors.

REVIEW OF PAST WORK: This is one of the oldest activities of the Station and includes work done by Hofmann, Munger, Simson, McArdle, and others in addition to the present personnel. Basic studies have been made in the field of fuel and weather relationships and an evolution of important field applications has produced the present fire danger rating scheme, which is still in a state of active growth. This scheme is used by the national forests, national parks, and to some extent by other fire control agencies of the region. Inexpensive instruments designed and made available by the Station made this development practicable. Studies have been made of the number and location of fire danger stations required for satisfactory sampling of conditions on a ranger district. Studies of fire behavior factors have been made on 37 large and small fires.

ACCOMPLISHMENTS DURING PAST YEAR: Morris prepared a new 100-unit burning index table that was used experimentally on the national forests as part of the fire danger rating system. Fire behavior observations were made on two fires. The effect of different degrees of partial cutting on fire danger was studied on the West Fir timber sale in cooperation with the Forest.

PLANS FOR NEXT YEAR: Review basic information on fire behavior available from recent studies at this and other stations and if necessary revise the burning index table for fire danger rating. Prepare report on period of observation required in wind measurements. Prepare a report on the effect of partial cutting on fire danger as observed at West Fir. Prepare a progress report on the study of going fires.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Matthews and Morris.

RS - NW
FIRE
Control

January 1941

FIRE STUDIES - CONTROL

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest Fire Protection

LINE PROJECT: Control

PURPOSE OF WORK: To study the presuppression, detection, suppression, and other aspects of well-rounded forest fire control.

REVIEW OF PAST WORK: An "hour control" analysis of national forest fire records was completed in 1932. Visibility has been studied and a simple instrument for measuring visibility has been provided for lookout use. Lightning storms as a fire cause have been studied. Time studies have been made of the manpower production of fire control lines to improve fire suppression practice. A technique for making fuel hazard inventories has been developed and widely used in the region. Principles and procedures have been developed to be used in planning and coordinating the detection, transportation, and guard-placement facilities so as to most efficiently meet fire control objectives. In 1939 attention was directed to the fire control problems of private lands.

ACCOMPLISHMENTS DURING PAST YEAR: Fire problems of the private forest lands of western Snohomish County, Washington, were analyzed and a plan for the adequate control of fire on them was presented in a 77-page report which has been widely circulated. This report was the subject of an address before the annual meeting of the Western Forestry and Conservation Association. It was also discussed at several conferences of fire control executives. Several months were spent in making a field and office analysis of a second sample area, Clackamas and Marion Counties in Oregon, and in preparing a preliminary report.

PLANS FOR NEXT YEAR: High priority will be given to the study of adequate protection of private forest lands and the completion of the analysis and the report on the Clackamas-Marion unit in Oregon. Further publicity will be given to the results of the sample area studies.

A problem analysis of the entire fire studies field in this region will be completed.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Matthews and Morris.

RS - NW
FIRE
Effects

January 1941

FIRE STUDIES - EFFECTS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest Fire Protection

LINE PROJECT: Effects

PURPOSE OF WORK: Investigate the effects of fire, particularly damage, but inclusive of closely related beneficial uses such as aids to fire protection and silviculture, especially the use and effectiveness of fire in removing the fuel hazard after logging.

REVIEW OF PAST WORK: Fire data have been analyzed to determine the annual average extent, frequency, and damage of fires in the Douglas-fir region. A large number of plots and tracts in clear-cut burned and unburned slash have been under observation since 1927. A progress report on slash disposal and forest management following clear cutting was prepared for publication by Munger and Matthews in 1938. Slash in partially cut stands has been studied recently in connection with other studies of such stands.

ACCOMPLISHMENTS DURING PAST YEAR: Proof of the circular on clear-cut slash disposal was read. Some further studies were made of slash in partial cut stands.

PLANS FOR NEXT YEAR: Continue field work in partially cut stands. Distribute and give publicity to the Douglas-fir slash disposal bulletin.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT; Munger, Matthews, and Morris.

RS - NW
GENETICS

January 1941

TESTS OF REGIONAL RACES OF DOUGLAS-FIR AND PINE AND OF HYBRID POPLARS

FIELD DIVISION: Forest Management Research

WORK PROJECT: Forest Genetics

LINE PROJECT: Breeding and Regional Races

PURPOSE OF WORK: To test regional races of ponderosa pine and the progeny of known Douglas-fir parentage, and to test in the field hybrid poplars.

REVIEW OF PAST WORK: (a) In 1915 and 1916 six plantations of Douglas-fir from 125 separate parents were established. These were examined annually for a number of years and now at 5-year intervals. A progress report on this study was published in 1936 entitled "Growth of Douglas Fir Trees of Known Seed Source" by Munger and Morris; (b) in 1928 plantations of ponderosa pine of 10 regional races were established in six localities, three of them off the national forests in cooperation with forest schools. These have been examined periodically, now on a triennial basis. Striking contrasts between the several races and between sites are apparent; (c) as a measure of cooperation with the Northeastern Forest Experiment Station cuttings of the hybrid poplars they developed have been grown at the Wind River Nursery and outplanted in two series of tests, the first in 1935. The first plantation at Wind River suffered severely because of unfavorable site and the first plantation at Cascade Head from depredations of rodents.

ACCOMPLISHMENTS DURING PAST YEAR: (a) These tests did not come up for examination this year; (b) these plantations were all reexamined in 1940 and a progress report summarizing the results of the past 13 years' observations was prepared; (c) the plantation at Lady Island was replicated and both plantations reexamined in early summer and in the fall.

PLANS FOR NEXT YEAR: (a) All plantations to be examined in spring; (b) no work; (c) the plantation on Lady Island and at Cascade Head to be examined and perhaps cleaned.

DATE OF COMPLETION: (a) 20 or 30 years hence, longer if expanded; (b) ditto; (c) ditto.

ASSIGNMENT: (a) Morris; (b) and (c) Munger.

RR - NW
GRAZING MANAGEMENT
Summer Ranges
Management of Cattle Range

January 1941

DEVELOP IMPROVED METHODS OF MANAGING NATIONAL FOREST SUMMER RANGE GRAZED BY CATTLE

FIELD DIVISION: Range Research

WORK PROJECT: Grazing Management

LINE PROJECT: Summer Ranges: methods of managing national forest ranges in the mountainous regions of the West.

PURPOSE OF WORK: 98,000 cattle and horses obtain summer forage on national forest ranges east of the summit of the Cascade Mountains in Washington and Oregon. Summer range forage in this region is 40 percent short of being in balance with the supply of spring, fall and winter forage, partly because of a natural lack and partly because of depleted forage conditions on mountainous range lands. It is the objective of this project to work out improved management methods, so as to increase the quality and quantity of forage production on cattle ranges, thereby effecting a better balance between seasonal forage supply.

REVIEW OF PAST WORK: Preliminary plans for the project were prepared and approved by the Divisions of Research and Range Management. The Starkey Cattle Allotment on the Umatilla National Forest was selected as suitable for a cattle management research center. A range survey and a utilization survey were made of the allotment during 1939.

ACCOMPLISHMENTS DURING PAST YEAR: On July 11, 1940, the Starkey Cattle Allotment was officially designated as the Starkey Experimental Range. A utilization survey was made of the area at the close of the grazing season. As the initial guide to cattle distribution under the experimental set-up, the distribution of forage on the allotment was computed from the 1939 range survey using proper use factors developed from the 1939 and 1940 utilization surveys. Physical improvements included: (1) Construction of three miles of boundary fence and (2) development of four important springs.

PLANS FOR NEXT YEAR: The final, detailed working plan for the project will be completed. Contingent on availability of means, needed improvements such as fencing and development of additional water places will be made. General studies on grazing habits and forage preferences of cattle will be continued until such time as sufficient fences are constructed to make possible the more intensive studies.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford and Reid.

RR - NW
MANAGEMENT
Summer Ranges
Management of Sheep Range

January 1941

DEVELOP IMPROVED METHODS OF MANAGING NATIONAL FOREST SUMMER RANGE GRAZED BY SHEEP

FIELD DIVISION: Range Research

WORK PROJECT: Grazing Management

LINE PROJECT: Summer Ranges: methods of managing national forest ranges in the mountainous regions of the West.

PURPOSE OF WORK: 550,000 sheep obtain summer forage on national forest ranges east of the summit of the Cascade Mountains in Washington and Oregon. Summer range forage in this region is 40 percent short of being in balance with the supply of spring, fall and winter forage, partly because of a natural lack and partly because of depleted forage conditions on mountainous range lands. It is the objective of this project to work out improved management methods so as to increase the quality and quantity of forage production on sheep ranges, thereby effecting a better balance between seasonal forage supply.

REVIEW OF PAST WORK: None.

ACCOMPLISHMENTS DURING PAST YEAR: The Experiment Station has cooperated with the Regional Office and Oregon State College in helping to formulate a plan for research to be conducted by the Forest Service and by the Oregon State College on the Bull Run Allotment, Whitman National Forest. This cooperation consisted of furnishing supervision and one man on a range survey and a utilization survey of the allotment and completing basic compilation of the data from both surveys.

PLANS FOR NEXT YEAR: Continue cooperation with Oregon State College and the Regional Office as needed in developing and putting into effect a plan for the sheep management research.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford, Reid.

RR - NW
GRAZING MANAGEMENT
Summer Ranges
Comparison of Range Survey Methods

January 1941

APPRAISAL OF RANGE SURVEY METHODS FOR NATIONAL FOREST SUMMER RANGES

FIELD DIVISION: Range Research

WORK PROJECT: Grazing Management

LINE PROJECT: Summer Ranges: methods of managing national forest ranges in the mountainous regions of the West.

PURPOSE OF WORK: To determine which range survey method is most desirable for use on national forest ranges. To compare results from the reconnaissance and the point-observation-plot methods of survey, with and without aerial photography, in order to determine the good points and shortcomings of each, and to evaluate the methods from the standpoint of accuracy, cost, flexibility, and adaptiveness in formulating sound range management plans.

REVIEW OF PAST WORK: The field work for this project was completed in 1939 according to a work plan prepared jointly with the Washington offices of Range Management, Forest Measurements, and Range Research with the counsel of all western experiment stations and regions. Basic compilation was completed in 1939.

ACCOMPLISHMENTS DURING PAST YEAR: Analysis of the basic data was completed and a manuscript summarizing and interpreting the results of the study was prepared and submitted to all of the western experiment stations and regions of the Forest Service, to the Soil Conservation Service, and to others in the Department of Agriculture interested in range surveys for their review and comment. Among the conclusions developed from the study was that both the reconnaissance and the square-foot-density methods using the type-sampling procedure, and the reconnaissance method using the grid procedure are justifiable for use on range surveys on national forests when they are considered from the standpoint of cost and accuracy. The square-foot-density method using a grid procedure even when conducted at the intensity of 20 plots per section is not recommended for this purpose.

PLANS FOR NEXT YEAR: Review comments on the manuscript and incorporate them into final report to be published as a Department Technical Bulletin.

DATE OF COMPLETION: June 30, 1941.

ASSIGNMENT: Pickford, Reid, in cooperation with Soil Conservation Service, N. T. Nelson.

RR - NW
GRAZING MANAGEMENT
Summer Ranges
Douglas-fir Cut-over Lands

January 1941

MANAGEMENT OF SUMMER RANGES IN WESTERN OREGON AND WASHINGTON

FIELD DIVISION: Range Research

WORK PROJECT: Grazing Management

LINE PROJECT: Summer Ranges: methods of managing national forest ranges in the mountainous regions of the West.

PURPOSE OF WORK: A study of the grazing possibilities on burned or logged lands in the Douglas-fir region.

REVIEW OF PAST WORK: From 1924 to 1935 a detailed study was made of grazed sample plots on logged and burned areas in the Wind River Valley. Results of this phase of the study are covered by various file reports, a J.A.R. article, "Vegetative Changes and Grazing Use on Douglas-fir Cut-over Lands", by D. C. Ingram, and Research Notes No. 26, "Plant Succession on a Cut-over, Burned, and Grazed Douglas Fir Area."

ACCOMPLISHMENTS DURING PAST YEAR: None. Project inactive.

PLANS FOR NEXT YEAR: Contingent on availability of funds to finance an intensive study of the economic and ecological aspects of seeding cut-over Douglas-fir timber lands to cultivated grass species.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford.

RR - NW
GRAZING MANAGEMENT
Utilization Standards

January 1941

DETERMINATION OF STANDARDS OF SATISFACTORY FORAGE UTILIZATION ON SUMMER RANGES OF EASTERN OREGON AND WASHINGTON

FIELD DIVISION: Range Research

WORK PROJECT: Grazing Management

LINE PROJECT: Utilization Standards: determination of standards of satisfactory forage utilization on summer ranges of eastern Oregon and Washington.

PURPOSE OF WORK: To determine the degree to which each important forage species and type can be utilized and perpetuate itself, and also to develop methods for measuring this utilization.

REVIEW OF PAST WORK: Tentative use standards developed for green fescue range show: (1) green fescue (Festuca viridula) is the key species; (2) the fescue should not be grazed heavier than 50 percent; (3) 25 to 50 percent use is recommended if erosion is present. Studies show the needlegrass-fleeceflower type to be far below climax condition, extremely susceptible to erosion, and to have a safe grazing capacity at least 90 percent below that of the ecological climax. The needlegrasses should not be grazed by sheep more than 30 percent on stable soils; not more than 15 percent on unstable soils. Methods studies indicate that to measure forage production within 10 percent accuracy limits a minimum of 125 plots are required.

ACCOMPLISHMENTS DURING PAST YEAR: Two manuscripts presenting past results were prepared and submitted to the Washington Office for their review and comments. One presented for green fescue ranges how to determine (1) current range condition, (2) decline and improvement in range condition, and (3) current proper degree of use. The other discussed the accuracy of field methods of determining degree of use of range grasses and recommended ocular estimates of the degree of use on a series of small plots as a simpler means of measuring percent utilization than the stubble-height method. The use of meadow plants by sheep was studied on two meadows of the Whitman National Forest.

PLANS FOR NEXT YEAR: Research during 1941 will be pointed towards the development of tentative use standards for timbered ranges of eastern Oregon and Washington. The two manuscripts now being reviewed will be put into final form for publication.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford, Reid, _______.

RR - NW
WESTERN RANGE SURVEY
General

January 1941

COOPERATIVE WESTERN RANGE SURVEY

FIELD DIVISION: Range Research

WORK PROJECT: Grazing Management

LINE PROJECT: Western Range Survey: Cooperative Western Range Survey.

PURPOSE OF WORK: In cooperation with agencies of the U. S. Departments of Agriculture and Interior who have jurisdiction in range matters or of range lands, from range surveys in Oregon and Washington already made or which may be made, to determine on a county basis (1) acreage and grazing capacity of vegetation types and subtypes and (2) nature, cause and logical solution of major range problems.

REVIEW OF PAST WORK: Project was started March 31, 1937, under memorandum of understanding of that date and terminating March 1, 1938. Field surveys were completed and plans for future land use were prepared for 1-3/4 million acres of range lands in Morrow County (Oregon) and Kittitas County (Washington), in a cooperative project in which eight public agencies actively participated. With the assistance of the Work Projects Administration an additional 2½ million acres of AAA surveys in Oregon were assembled in tabular form in 1939.

ACCOMPLISHMENTS DURING PAST YEAR: Acreages and grazing capacities of 5,195,000 acres of range lands in Oregon and Washington compiled in cooperation with the Work Projects Administration were incorporated into a report and distributed to the cooperating agencies. The Interagency Committee continued to function and is proving a valuable means by which to discuss mutual range problems, to coordinate aerial survey activity of the various bureaus, and to maintain a cumulative progress map of range surveys.

PLANS FOR NEXT YEAR: Continue active participation in the Interagency Committee.

DATE OF COMPLETION: Indefinite.

ASSIGNMENT: Pickford.

RP - NW
TIMBER CONVERSION
Logging and Milling

January 1941

MILL PRODUCTION STUDIES

FIELD DIVISION: Forest Products

WORK PROJECT: Timber Harvesting and Conversion

LINE PROJECT: Conversion: Logging and Milling

PURPOSE OF WORK: The development and furtherance of sound milling practice as a means to sustained yield management, better silviculture, and more efficient utilization.

A. In the Douglas-fir region
B. In the ponderosa pine region

REVIEW OF PAST WORK: A. Grade-production studies completed in several large Douglas-fir mills. Reports prepared. Sawing time and grade-production studies conducted in 10 small (under 100 M) Douglas-fir mills. Data awaiting analysis.

B. Grade production studies, using a new set of log grades, completed in 10 ponderosa pine mills. Sawing time studies to determine effect of equipment on costs conducted in 5 small (under 100 M) pine mills. Reports prepared. Data from several mills reworked for Forest Service appraisals for sales and exchanges.

ACCOMPLISHMENTS DURING PAST YEAR:

A. Field work completed on a grade-production study in a 100-M capacity Douglas-fir mill.

B. A second grade-production study made in an 80-M capacity mill at Klickitat, Washington. Data compiled, report completed. A large part of the computations for a regional report summarizing procedures and results completed.

PLANS FOR NEXT YEAR:

A. Continue work in Douglas-fir by making at least one more study. Analyze sawing-time data already obtained in small mills.

B. Complete regional report.

DATE OF COMPLETION: Continuous project. Regional report under "B" to be completed in 1941.

ASSIGNMENT: Lodewick and Johnson.

RP-NW
TIMBER CONVERSION
Utilization

January 1941

SPECIES AND PRODUCTS UTILIZATION

FIELD DIVISION: Forest Products

WORK PROJECT: Timber Harvesting and Conversion

LINE PROJECT: Wood Use Development: Species and Products Utilization

PURPOSE OF WORK: Analysis of the factors affecting the use of minor species and so-called minor products.

A. Minor species utilization
B. Minor products utilization

REVIEW OF PAST WORK:

A. Data accumulated and published on red alder, bigleaf maple, Oregon white oak, and black cottonwood. Miscellaneous data collected for other species.

B. Measurements made and reports published on solid contents of pulpwood and on yields for trees of different sizes. Plans completed for cooperation with Forest Products Laboratory on cascara bark yields, production and utilization.

ACCOMPLISHMENTS DURING PAST YEAR:

A. A few data collected.
B. Nothing done.

PLANS FOR NEXT YEAR:

A. and B. Continue collection of data as and if funds and personnel permit.

DATE OF COMPLETION: Continuous project.

ASSIGNMENT: Johnson and Lodewick.

RP - NW
WOOD PRESERVATION
Service Records

January 1941

STUDIES ON THE PROPERTIES OF WEST COAST WOODS

FIELD DIVISION: Forest Products

WORK PROJECT: Seasoning and Physical Properties

LINE PROJECT: Properties of West Coast Woods

PURPOSE OF WORK: To carry on investigations in cooperation with and supplementing those of the Forest Products Laboratory in wood durability and preservation.

REVIEW OF PAST WORK: Work plans completed. Data on all arsenic-paste treated Forest Service lines in R-6 compiled. Thirteen lines established for periodic examination. Data on all new installations of arsenic-treated lines kept current. Current inspections of experimental lines made.

ACCOMPLISHMENTS DURING PAST YEAR: Inspection of nine lines made, and report prepared.

PLANS FOR NEXT YEAR: Inspect Washington lines. Keep new pole installation data current.

DATE OF COMPLETION: Continuous project.

ASSIGNMENT: Lodewick.

RP - NW
WOOD STRUCTURE
Identification

January 1941

STRUCTURE AND IDENTIFICATION

FIELD DIVISION: Forest Products

WORK PROJECT: Structure and Growth

LINE PROJECT: Structure and Identification of Native Woods

PURPOSE OF WORK: To carry on investigations in cooperation with and supplementing those of the Forest Products Laboratory in identification of woods and fibers.

REVIEW OF PAST WORK: Routine identifications. Articles on wood and wood fiber identification published.

ACCOMPLISHMENTS DURING PAST YEAR: Routine identifications.

PLANS FOR NEXT YEAR: Continue routine.

DATE OF COMPLETION: Continuous project.

ASSIGNMENT: Lodewick.

RE - NW
STATISTICS

January 1941

STATISTICAL STUDY OF PRODUCTION: USE AND PRICE TRENDS OF P.N.W. FOREST PRODUCTS

FIELD DIVISION: Forest Products

WORK PROJECT: Forest Products Statistics

LINE PROJECT: Forest Products Statistics: Statistical study of production; use and price trends of P.N.W. forest products.

PURPOSE OF WORK: To collect, summarize, and distribute all available statistics on the forest products of Oregon and Washington.

A. Minor products
B. Census

REVIEW OF PAST WORK:

A. Report on minor forest products, their production and use completed in 1931. Additional and supplementary data compiled since then. Price charts for chemical forest products prepared annually.

B. Annual census of lumber, lath, shingle, and log production for past years completed. Report on distribution of Oregon and Washington lumber 1920-34 published. Similar report for 1936 released. Annual log and shingle prices compiled annually.

ACCOMPLISHMENTS DURING PAST YEAR:

A. General and supplementary information on minor products collected. Price charts kept current.

B. Collected lumber, lath, shingle, and log census for 1939 in cooperation with Bureau of the Census. Log and shingle prices for 1939 prepared and released.

PLANS FOR NEXT YEAR:

A. Continue collection of data as time and funds permit.
B. Conduct 1940 census.

DATE OF COMPLETION: A and B. Continuous projects.

ASSIGNMENT: A and B. Johnson.

RE - NW
FOREST SURVEY
Requirements

January 1941

REQUIREMENTS

FIELD DIVISION: Forest Survey

WORK PROJECT: Survey of forest resources, present and future requirements.

LINE PROJECT: Requirements

PURPOSE OF WORK: As a part of the national survey to determine present and prospective requirements for forest products.

REVIEW OF PAST WORK: Completed studies of urban dwelling and garage requirements, urban repairs and alteration requirements, and farm fencing requirements. Field work on farm building requirements complete, report commenced.

ACCOMPLISHMENTS DURING PAST YEAR: Progress on farm buildings report.

PLANS FOR NEXT YEAR: Complete farm buildings requirement report.

DATE OF COMPLETION: 1941.

ASSIGNMENT: Division of Forest Products; Lodewick.

RE - NW
FOREST SURVEY
General

January 1941

INTERPRETATION, ANALYSIS, AND PREPARATION OF REPORTS

FIELD DIVISION: Forest Survey

WORK PROJECT: Survey of forest resources, present and future requirements.

LINE PROJECT: Interpretation, analysis, and preparation of reports.

PURPOSE OF WORK: To analyze the findings of inventory, growth, and drain phases of the forest survey and correlate these data with other economic data to make available to public and private agencies basic facts for formulating principles, policies, and plans for sound management of the region's forest resources.

REVIEW OF PAST WORK: Basic inventory statistics published by county, State, and region for Douglas-fir and ponderosa pine regions in 71 reports. Growth data published for Douglas-fir region. Comprehensive reports for Douglas-fir and ponderosa pine regions prepared.

ACCOMPLISHMENTS DURING PAST YEAR: Published revised inventory statistics for Washington, Cowlitz, Coos, Clallam, and Thurston Counties. Published ponderosa pine growth report and Washington State report. Checked galley proof Douglas-fir regional report and revised manuscript ponderosa pine regional report. Analyzed and reported on supply of Sitka spruce for airplane manufacture. Prepared outline for Grays Harbor unit report.

PLANS FOR NEXT YEAR: Publish revised inventory statistics for 7 counties. Publish Grays Harbor unit report and prepare South Puget Sound unit report.

DATE OF COMPLETION: 7 county reports at approximately monthly intervals, commencing February 15. Grays Harbor report July 1941, South Puget Sound report December 1941.

ASSIGNMENT: Cowlin, Moravets, Briegleb, and Buell.

RE - NW
FOREST SURVEY
General

January 1941

KEEPING FINDINGS CURRENT

FIELD DIVISION: Forest Survey

WORK PROJECT: Survey of forest resources, present and future requirements.

LINE PROJECT: Keeping findings current.

PURPOSE OF WORK: To maintain the currency of the survey findings and thus be able to provide constantly up-to-date information on forest resources of the North Pacific Region.

REVIEW OF PAST WORK: Inventory of 12 counties in Douglas-fir region revised in field; office compilation completed for 8 counties. Type maps revised and published for 9 counties. Data on cutting drain collected and compiled annually.

ACCOMPLISHMENTS DURING PAST YEAR: Completed field work in east Jefferson, Kitsap, Mason, Wahkiakum, Benton, and Polk Counties. Office compilation completed for Clallam, Cowlitz, Washington, west Jefferson, and Wahkiakum Counties; partly completed for Lewis, Mason, Kitsap, Benton, and Polk Counties. Revised type maps published for Polk, Benton, Lewis, Wahkiakum, Cowlitz, Thurston, Kitsap, and Mason Counties. Sawlog drain for 1939 compiled.

PLANS FOR NEXT YEAR: Revise inventory by field examination for 7 counties in the Douglas-fir region. Collect and compile sawlog drain for 1940.

DATE OF COMPLETION: Field work October 1941. Office work June 1942.

ASSIGNMENT: Cowlin, Moravets, Briegleb, Buell, Johnson, and assistants.

RE - NW
NEW PUBLIC DOMAIN
Oregon and Washington

January 1941

TAX DELINQUENCY AND REVERSION TO PUBLIC OWNERSHIP OF FOREST LAND

FIELD DIVISION: Forest Economics

WORK PROJECT: New Public Domain

LINE PROJECT: New Public Domain: investigations of the causes, extent and trends of tax delinquency and reversion to public ownership of forest lands, relation to ownership and to forest practice, and the formulation of remedial measures.

PURPOSE OF WORK: (a) To determine the effects, causes and possible cures of unstable forest land ownership and (b) to apply findings to representative cases.

REVIEW OF PAST WORK: Extent of tax delinquency in 18 representative forest counties of the Douglas-fir region determined and progress reports published. Advanced writing of general report for Douglas-fir region covering results of investigations to date. Cooperated broadly with regional, State, county, and other agencies on land classification, plans for handling tax delinquent and forfeited forest lands, and analysis of proposed remedial measures.

ACCOMPLISHMENTS DURING PAST YEAR: Progressed with writing report and continued cooperation.

PLANS FOR NEXT YEAR: Preparation of a series of Station publications designed to cover the subject matter available in the New Public Domain study. These informal Station publications probably to be followed by formal departmental publication in summary form.

DATE OF COMPLETION: 1941.

ASSIGNMENT: Wilson.

RE - NW
FOREST TAXATION

January 1941

ADAPTION OF LOCAL GOVERNMENT TO FOREST LAND USE AND STUDIES OF EXISTING AND PROPOSED LOCAL TAX LAWS APPLICABLE TO FORESTS

FIELD DIVISION: Forest Economics

WORK PROJECT: Forest Taxation

LINE PROJECT: (1) Local government adaption: planning local government with special reference to forest and wild land areas. (2) Forest taxation: investigation of the effects of tax laws, methods, and practices upon forestry and the relationship between forest practices, public ownership and property tax burdens; and the formulation of sound principles and methods of forest taxation.

PURPOSE OF WORK: (1) To study the effect of the local government organization and debt on the absolute burden and stability and predictability of taxes on forests, and on the use of forest land; to devise plans for rationalizing and adapting local government areas and organization to the requirements of a forest area in order to stabilize property taxes on forests, to promote efficiency, to preserve and strengthen local self-government, and in general to reduce some of the adverse effects of local government requirements on forestry. (2) To study the present and probable effects of local government taxes and of special forest tax plans and proposed State tax legislation on forest perpetuation and management; to devise methods and plans for improving the operation of present tax laws in the interests of forestry.

REVIEW OF PAST WORK: Project was begun in 1937 as a detailed application to the region of the principles and recommendations in the formal report of the Forest Taxation Inquiry. Studies in local government have been under way in Washington since 1937. Office reports have been written for three western Washington counties.

ACCOMPLISHMENTS DURING PAST YEAR: Attended Reforestation Law Hearings and studied operation of forest fee and yield tax law. Prepared and published report: Rural Tax Rates for 1940 in Oregon and Washington Counties. Made slight progress on Washington local government adaption study.

PLANS FOR NEXT YEAR: Finish local government adaption studies in 5 selected Washington counties and prepare for publication a State report based on findings in the 5 selected counties. If time permits initiate similar studies in Oregon. Prepare a statistical report on relationship between tax rates and public ownership of timber and also relationship between forest depletion by cutting and tax rates.

DATE OF COMPLETION: Continuing.

ASSIGNMENT: DeVries.

PRELIMINARY EXAMINATIONS

FIELD DIVISION: Flood Control

WORK PROJECT: Flood Control Surveys

LINE PROJECT: Preliminary Examinations

PURPOSE OF WORK: Preliminary reports are made to determine the need and nature of surveys to obtain fundamental data upon which to base a program of land use best suited to the control of run-off and the prevention of floods.

REVIEW OF PAST WORK: This was a new project in 1937. The work to December 31, 1939, consisted almost entirely of the preparation of preliminary reports, joint public flood-control hearings held in cooperation with the Army Engineers, and in developing work outlines for watershed surveys. Ten preliminary flood-control reports have been completed--7 in Washington, 1 in Oregon, and 2 in Alaska. A survey work outline was prepared for the Walla Walla watershed and a similar outline for the Willamette watershed was about 90 percent finished.

ACCOMPLISHMENTS DURING PAST YEAR: In cooperation with the BAE and SCS preliminary flood control reports for Moses Coulee and the Puyallup River in the State of Washington were completed and sent to Washington. A work outline, which is a detailed plan for watershed surveys, was completed for the Willamette River drainage. Joint public hearings on Neskowin Creek and the Yamhill River were held in cooperation with the Army Engineers. Considerable work was also done on preliminary flood control reports for the Umatilla River and Willow Creek in eastern Oregon, and the Tillamook Bay Region, the latter a group of streams emptying into Tillamook Bay.

PLANS FOR NEXT YEAR: Complete the Willow Creek, Umatilla, and Tillamook Bay reports. It is expected that considerable work will also be done on preliminary reports for the Green-Duwamish, Yakima, Snohomish, Palouse, John Day, and Crooked River watersheds.

DATE OF COMPLETION: See above.

ASSIGNMENT: Chapler and Bolles in cooperation with representatives of the BAE and SCS.

WATERSHED SURVEYS

FIELD DIVISION: Flood Control

WORK PROJECT: Flood Control Surveys

LINE PROJECT: Walla Walla Watershed Survey

PURPOSE OF WORK: Watershed surveys are made to determine the feasibility of controlling floods by upstream land management and engineering methods carried out on the areas where flood waters originate and before these surplus waters assemble into volumes of flood proportions. This will be attained by improved farm management methods, using such techniques as contour cultivation, strip cropping, and trashy fallow; proper range utilization, forest cutting and protection with a view to maintaining watershed cover; and field engineering such as contour trenching and check dams on small streams to retard run-off and increase absorption by the soil, thus reducing flood flows.

REVIEW OF PAST WORK: This project was started April 1, 1940, and is being carried on in cooperation with the Soil Conservation Service and the Bureau of Agricultural Economics.

ACCOMPLISHMENTS DURING PAST YEAR: The field work, involving a calculation of flood damages by the BAE, the determination of flood lines and channel capacities by the SCS, and a plant-soils survey and infiltration studies by the FS, has been completed and the greater part of the data compiled. Information necessary for the preparation of forest management, range management, game management, and fire protection plans has been obtained and these plans are now being prepared.

PLANS FOR NEXT YEAR: A watershed survey for the areas behind the dam sites on the Long Tom, Coast Fork, and Row Rivers, tributaries of the Willamette River upon which flood control dams are being constructed by the U. S. Engineers, has been recommended. Also, classification of the Willamette watershed as to justification, intensities and priority for survey of the 18 principal tributaries. A survey for Willow Creek in eastern Oregon may also be recommended by the Field Coordinating Committee.

DATE OF COMPLETION: The report for the Walla Walla watershed survey will be completed before July 1, 1941.

ASSIGNMENT: Wallace Robinson is handling the flood control work at Walla Walla. Chandler Jensen is in charge of preparing the forest management, range management, game management, and fire protection plans from data collected by the watershed survey.